



TEST REPORT

No. : GZIN161001906CCM

Date : Nov. 23, 2016

Page: 1 of 41

CLIENT NAME: FOSHAN VALLEN DECORATION MATERIALS CO., LTD.
ADDRESS: CHUANGYE ROAD 2ND , XIN JIAO INDUSTRIAL ZONE, DALIANG, SHUNDE TOWN,
FOSHAN CITY, GUANGDONG PR, CHINA

The following sample(s) was/ were submitted and identified on behalf of the client as:

Sample Name : Aluminum composite panel
SGS Ref. No. : GZIN161001906CCM
Manufacturer : FOSHAN VALLEN DECORATION MATERIALS CO., LTD.
Test Performed : Selected test(s) as requested by applicant
Date of Receipt : Oct. 25, 2016
Test Period : Oct. 25, 2016 to Nov. 07, 2016

Test result(s) : Please refer to the following page(s)

*****To be continued*****

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co.,Ltd
Guangzhou Branch

Jay Xue
Authorized signatory

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Guangzhou Branch Testing Laboratory

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Summary of Results:

No.	Test Item	Test Method	Result	Conclusion
1	Abrasion Resistance	ASTM D4060-14	Weight loss: 37mg	/
2	Adhesion Test of Coatings	ASTM D3359-09 ^{ε2} Method B	Adhesion classification: 5B	/
3	Coating Thickness	ASTM D7091-13	29.1μm	/
4	Color Difference	ASTM D2244-16	ΔE* _{ab} =0.2	/
5	Detergent Resistance	ASTM D2248-01a(2013)	No visual change	/
6	Effect of Household Chemicals	ASTM D1308-02(2013)	See results	/
7	Impact Resistance	ASTM D2794-93(2010)	Impact failure end point: 1.45kg·m	/
8	Neutral Salt Spray Test	ASTM B117-16	See results	/
9	Pencil Hardness	ASTM D3363-05(2011) ^{ε2}	Scratch hardness: 2H	/
10	Pull-off Test for Adhesion	ASTM D4541-09 ^{ε1} Method E	See results	/
11	Scratch Resistance	ISO 1518-1:2011	See results	/
12	Water Resistance (Immersion Method)	ASTM D870-15	See results	/
13	Boiling Water Adhesion	AAMA 2604-13 Section 8.4.1.1, Section 8.4.1.4, Section 8.4.1.2, Section 8.4.2	See results	/
14	Mortar Resistance	AAMA 2604-13 Section 8.7.2	See results	/
15	Deflection Temperature under Load	With reference to ASTM D648-16 and client's requirement	111.0 °C	/



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No.	Test Item	Test Method	Result		Conclusion
16	Density	ASTM C271/C271M-16	1280 kg/m ³		/
17	Flexural Test	With reference to ASTM D790-15 ⁵² Procedure A and client's requirement	Flexural Strength	111 MPa	/
			Flexural Modulus	10900 MPa	
18	Mass per Unit Area	With reference to ASTM D5947-11 and client's requirement	5735 g/m ²		/
19	Peel Strength	ASTM D903-98(2010)	1.06 kgf/mm		/
20	Flexural Shear Strength	ASTM C393/C393M-16	1.75 MPa		/
21	Shear Strength	ASTM D732-10	31.6 MPa		/
22	Flatwise Tensile Strength	ASTM C297/C297M-16	6.65 MPa		/
23	Tensile Test	ASTM D638-14	Tensile Strength	48.6 MPa	/
			Tensile Stress at Yield	48.6 MPa	
24	Plane Shear Test	ASTM C273/C273M-16	Plane Shear Strength	6.65 MPa	/
			Plane Shear Modulus	33.3 MPa	

Note: Pass : Meet the requirements;
 Fail : Does not meet the requirements;
 / : Not Apply to the judgment.



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1. Test Item: Abrasion Resistance

Sample Description: See photo

Test Method: ASTM D4060-14

Test Condition:

Wheel: CS-10

Load: 500g/wheel(total 1000g)

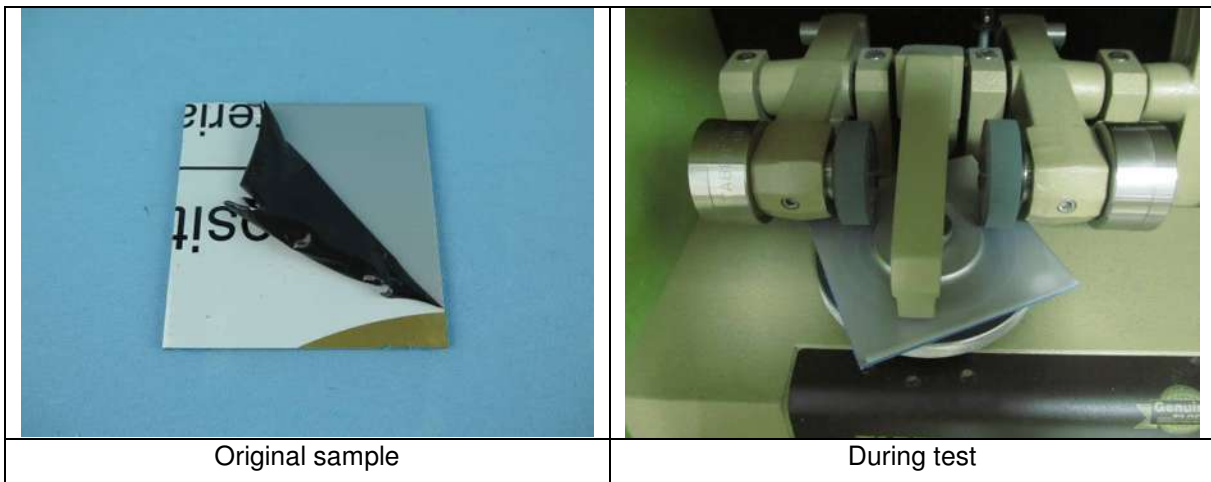
Cycles: 2000

Test Result:

Test Item	Weight loss
Abrasion Resistance	37 mg

Note: The protected film of test specimens was ripped off before test.

Test Photo:



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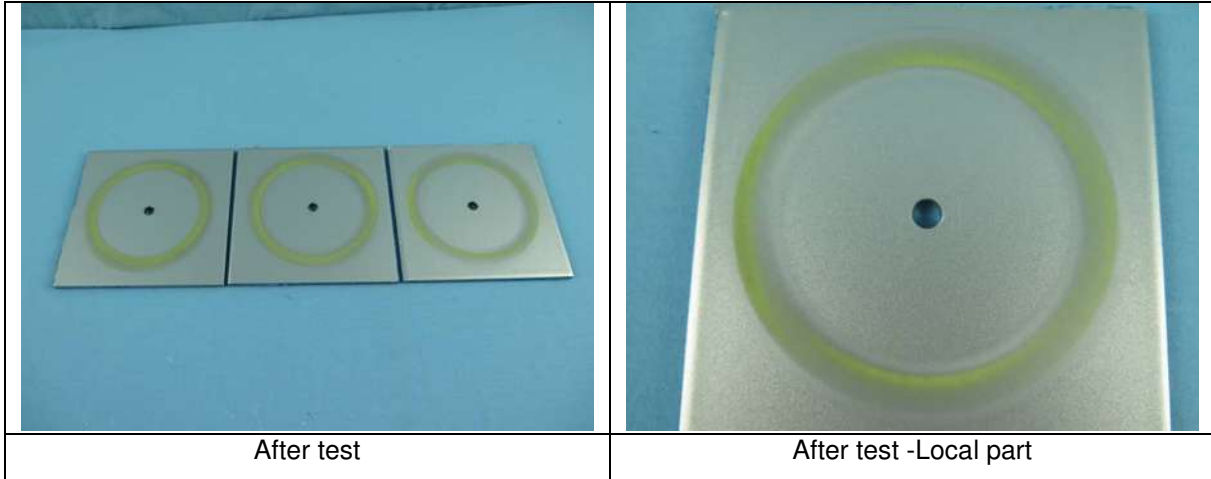
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2. Test Item: Adhesion Test of Coating

Sample Description: See photo

Test Method: ASTM D3359-09^{ε2} Method B

Test Condition:

Space: 1mm

Tape: Elcometer 99

Test Result:

Test Item	Adhesion classification
Adhesion Test of Coating	5B

Note:

1. According to ASTM D3359--09^{ε2} method B, in the adhesion classification-- 5B is the best, 0B is the worst.
2. The protected film of test specimens was ripped off before test.



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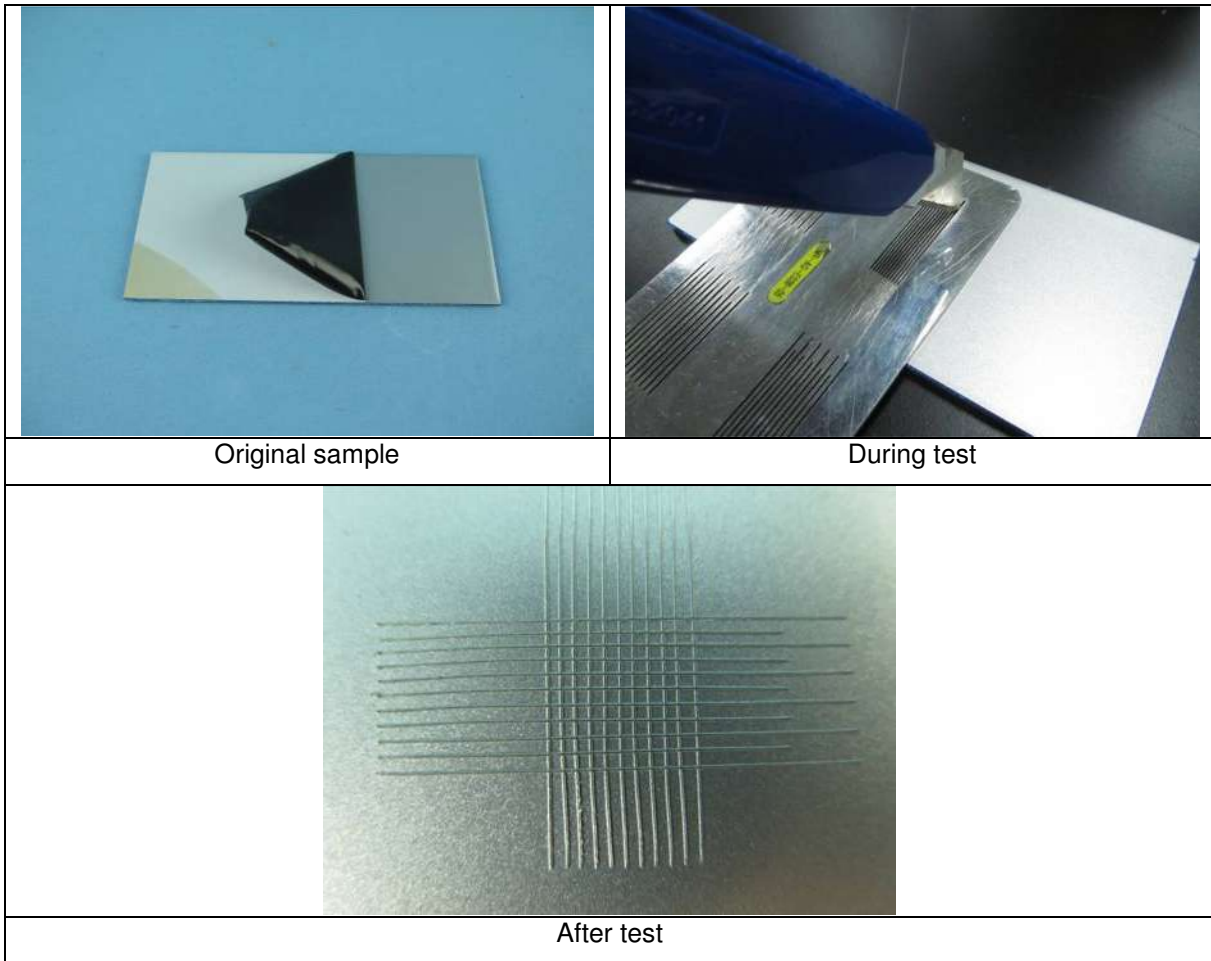
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Test Photo:



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3. Test Item: Coating Thickness

Sample Description: See photo

Test Method: ASTM D7091-13

Test Condition:

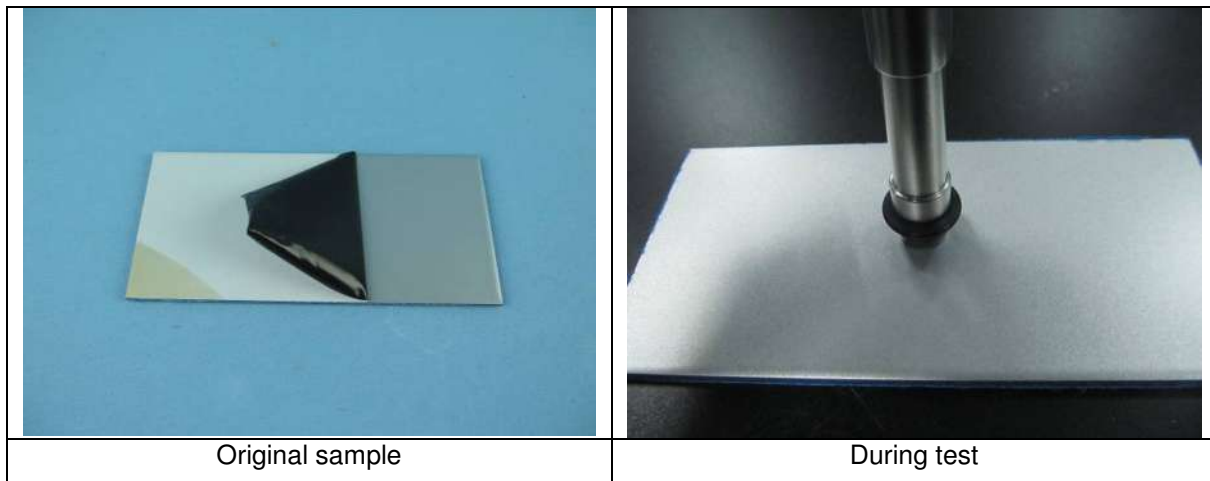
Eddy-Current Gauge

Test Result:

Test Item	Test Result
Coating Thickness	29.1 μm

Note: The protected film of test specimens was ripped off before test.

Test Photo:



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4. Test Item: Color Difference

Sample Description: See photo

Test Method: ASTM D2244-16

Test Condition:

Sphere spectrophotometer d/8

Illuminant: D65

Observer: 10°

Test mode: Specular Component Included

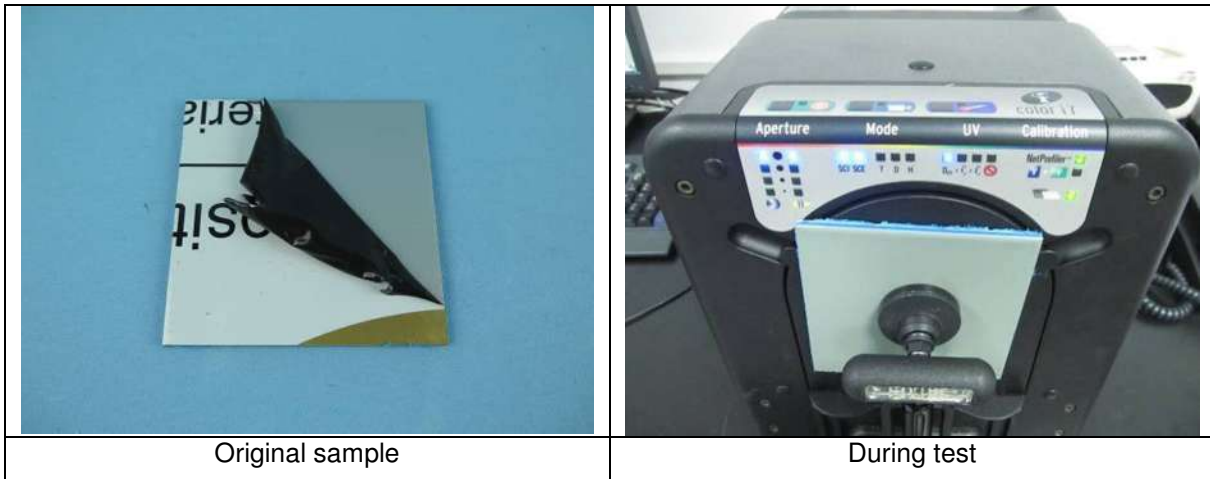
Aperture: 25mm

Test Result:

Test Item	ΔE^*_{ab}
Color Difference	0.2

Note: The protected film of test specimens was ripped off before test.

Test Photo:



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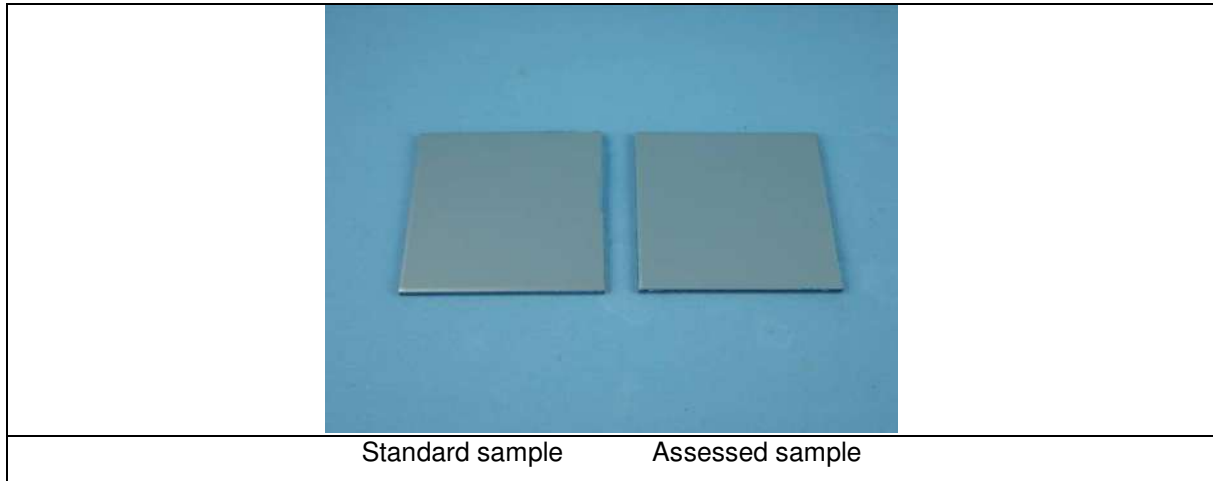
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5. Test Item: Detergent Resistance

Sample Description: See photo

Test Method: ASTM D2248-01a (2013)

Test Condition:

Immersion method

Temperature: 38°C

Time of contact: 72h

Test Result:

Test Item	Test Result
Detergent Resistance	No visual change



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Note:

1. The solid detergent composition is as follows:

Tetrasodium pyrophosphate (AR): 53% (m/m)

Sodium sulphate anhydrous (AR): 19% (m/m)

Sodium linear alkylarylsulfonate (AR): 20% (m/m)

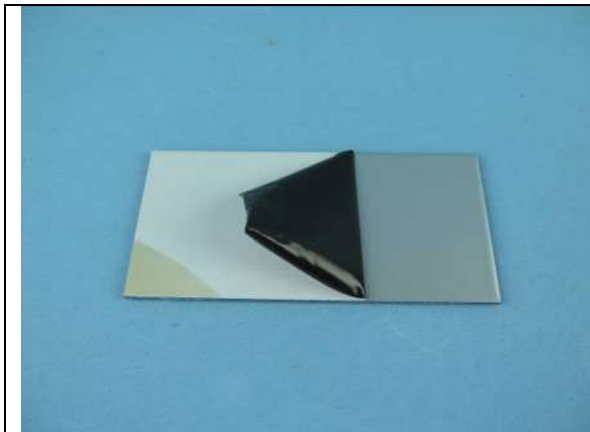
Sodium metasilicate hydrated (AR): 7% (m/m)

Sodium carbonate anhydrous (AR): 1% (m/m)

Prepare a 1%(m/m) solution of detergent with the solid detergent.

2. The protected film of test specimens was ripped off before test.

Test Photo:



Original sample



During test



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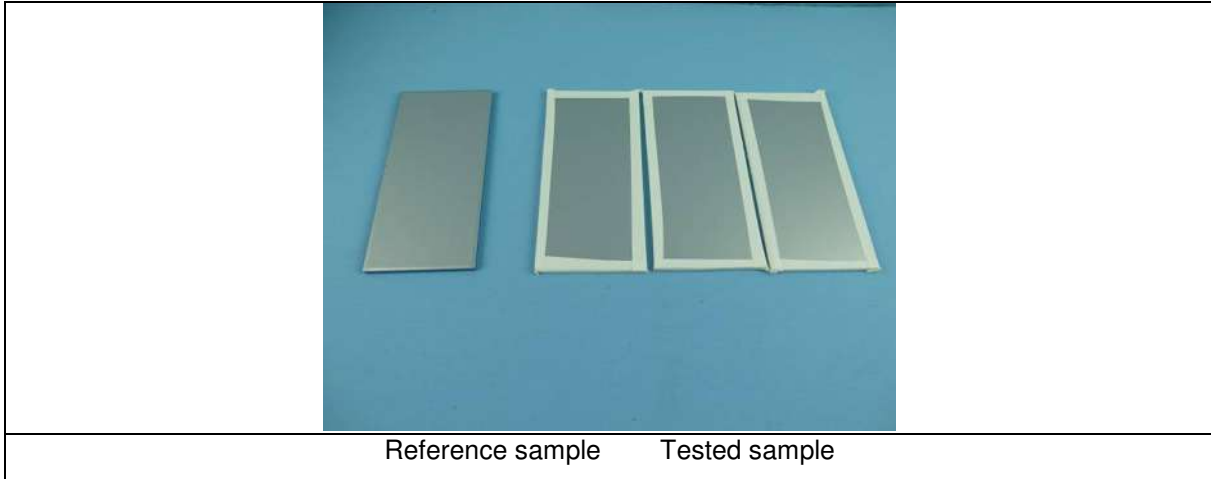
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6. Test Item: Effect of Household Chemicals

Sample Description: See photo

Test Method: ASTM D1308-02(2013)

Test Condition:

Spot method, 15min

Test Result:

Test Item	Test solution	Test Result
Effect of Household Chemicals	10%(V/V)HCl	No discoloration, change in gloss, blistering, softening, swelling, loss of adhesion or other visual change
	10%(m/m)NaOH	No discoloration, change in gloss, blistering, softening, swelling, loss of adhesion or other visual change
	Mobil® Super 1000 10W-40 Engine Oil	No discoloration, change in gloss, blistering, softening, swelling, loss of adhesion or other visual change

Note: The protected film of test specimens was ripped off before test.



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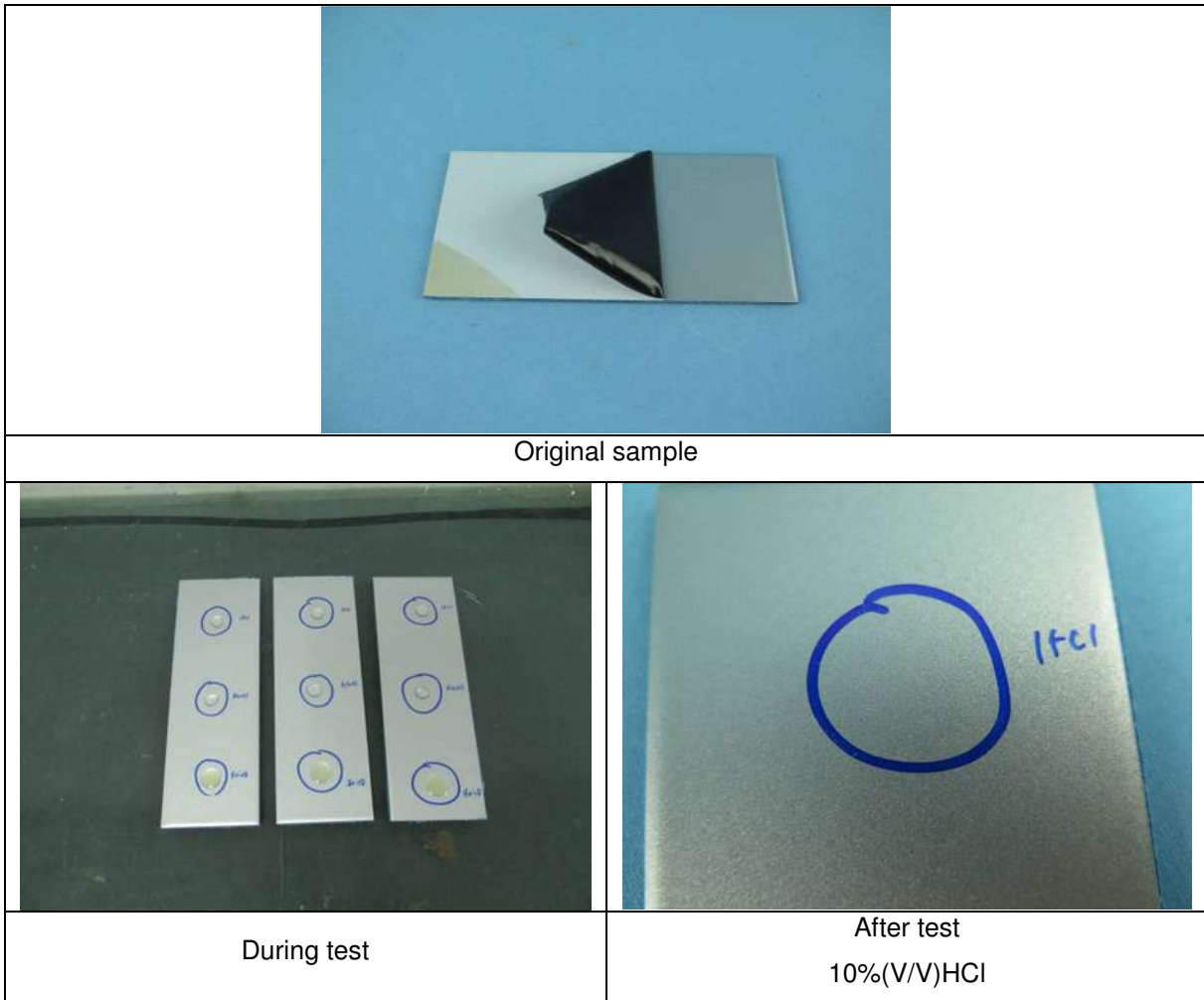
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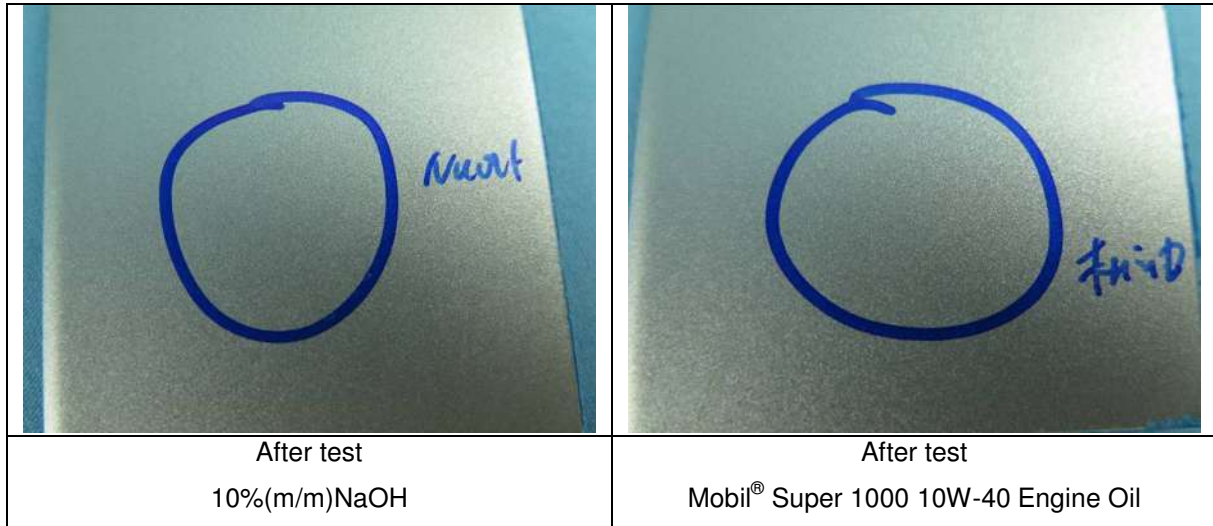


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7. Test Item: Impact Resistance

Sample Description: See photo

Test Method: ASTM D2794-93(2010)

Test Condition:

Coating thickness: 29.1µm

Sample thickness: 4.23mm

Diameter of the punch: 15.9mm

Impact model: intrusion

Test Result:

Test Item	Test Result
Impact Resistance	Impact failure end point: 1.45kg·m

Note: The protected film of test specimens was ripped off before test.



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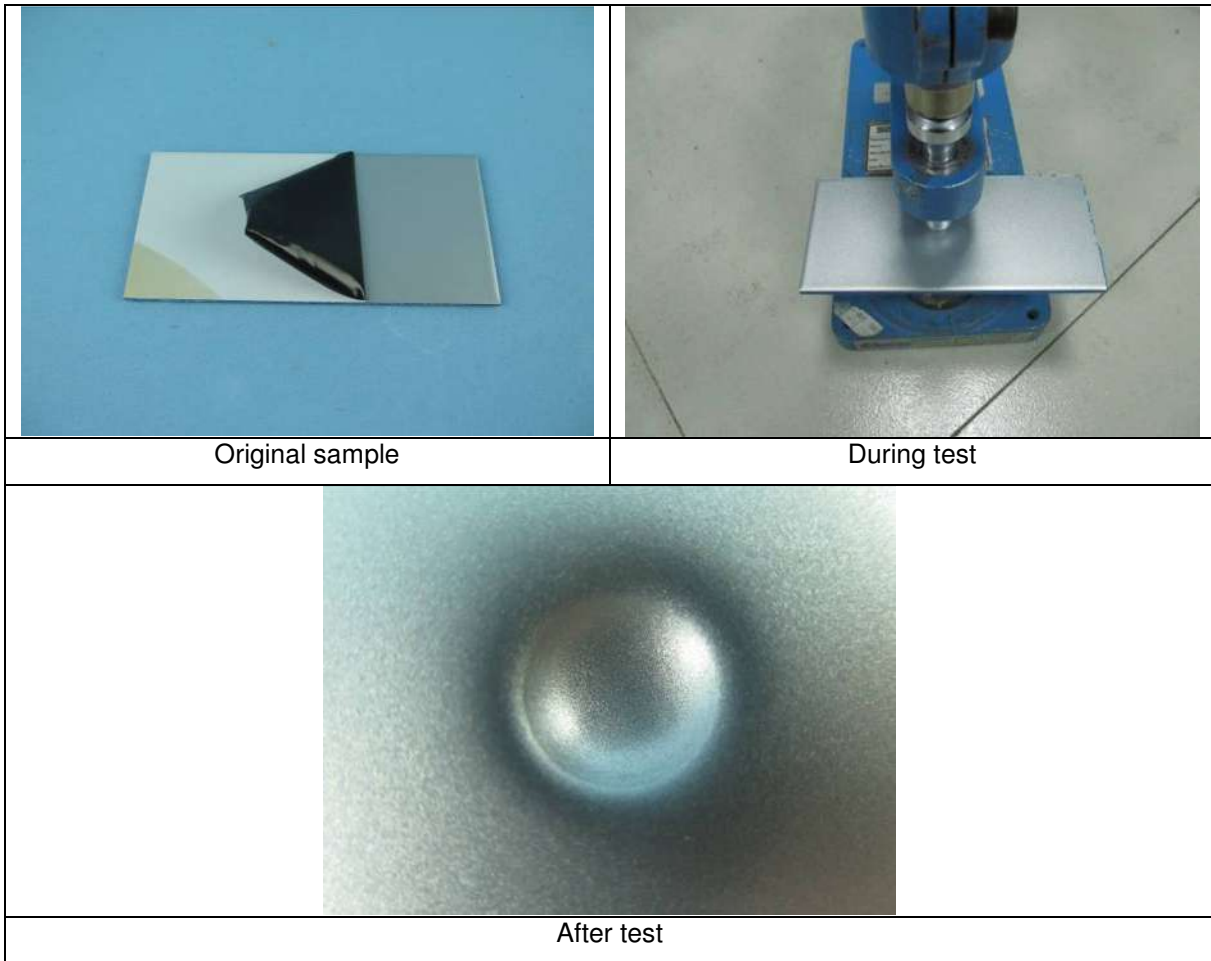
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8. Test Item: Neutral Salt Spray Test

Sample Description: See photo

Test Method: ASTM B117-16

Test Condition:

Concentration of solution collected: (5±1)% NaCl(m/m)

Chamber temperature: (35±2)°C

Volume of salt solution collected: (1.0~2.0)ml/(80cm²·h)

pH of collected solution at (23±3)°C: 6.5~7.2

Exposure period: 24h

Test Result:

Test Item	Appearance rating (See note 2)		General level
Neutral Salt Spray Test	#1	10	10
	#2	10	
	#3	10	

Note:

1. The protected film of test specimens was ripped off before test.



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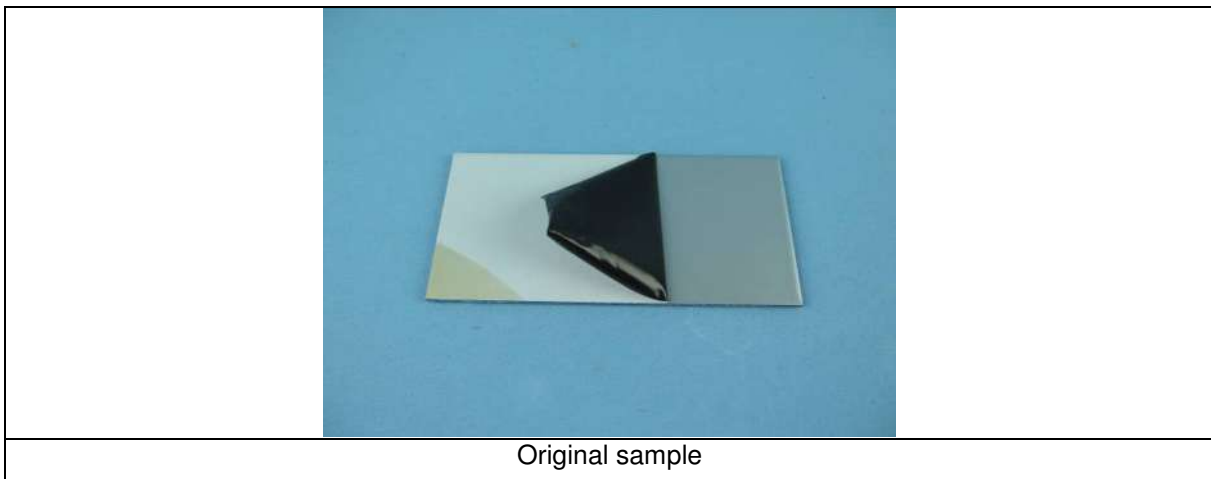
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2. Appearance rating refers to EN ISO 10289:2001, as follows:

Area of defects, A (%)	Appearance rating
0(No defects)	10
$0 < A \leq 0.1$	9
$0.1 < A \leq 0.25$	8
$0.25 < A \leq 0.5$	7
$0.5 < A \leq 1.0$	6
$1.0 < A \leq 2.5$	5
$2.5 < A \leq 5.0$	4
$5.0 < A \leq 10$	3
$10 < A \leq 25$	2
$25 < A \leq 50$	1
$50 < A$	0

Test Photo:



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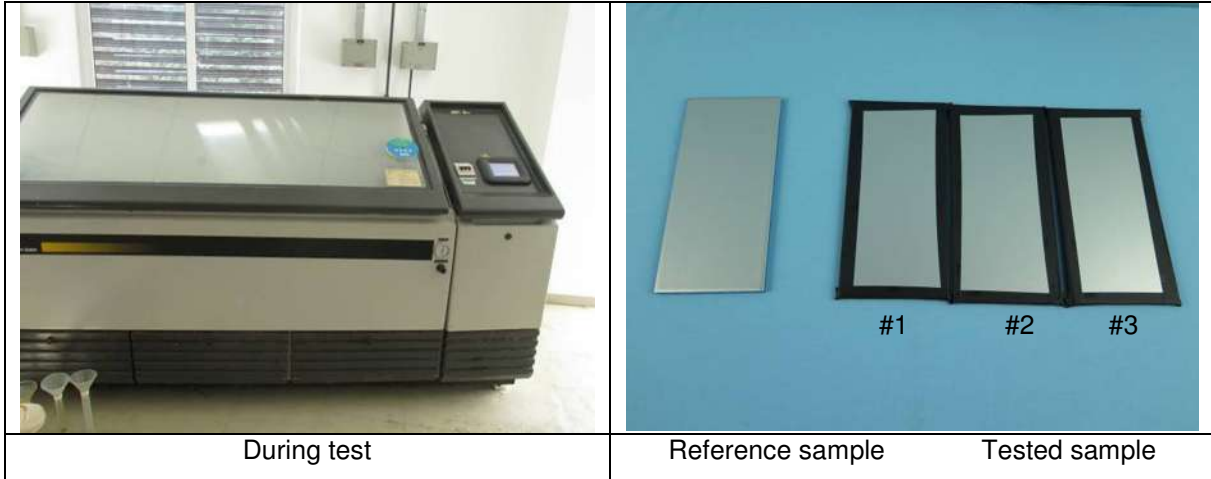
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9. Test Item: Pencil Hardness

Sample Description: See photo

Test Method: ASTM D3363-05(2011) ^{e2}

Test Condition:

Test Pencil: Mitsubishi® Uni

Test Result:

Test Item	Scratch hardness
Pencil Hardness	2H

Note:

1. According to ASTM D3363-05(2011) ^{e2}, 6H is the hardest and the grade 6B is the softest.

6B—5B—4B—3B—2B—B—HB—F—H—2H—3H—4H—5H—6H

Softer←-----→Harder

2. The protected film of test specimens was ripped off before test.



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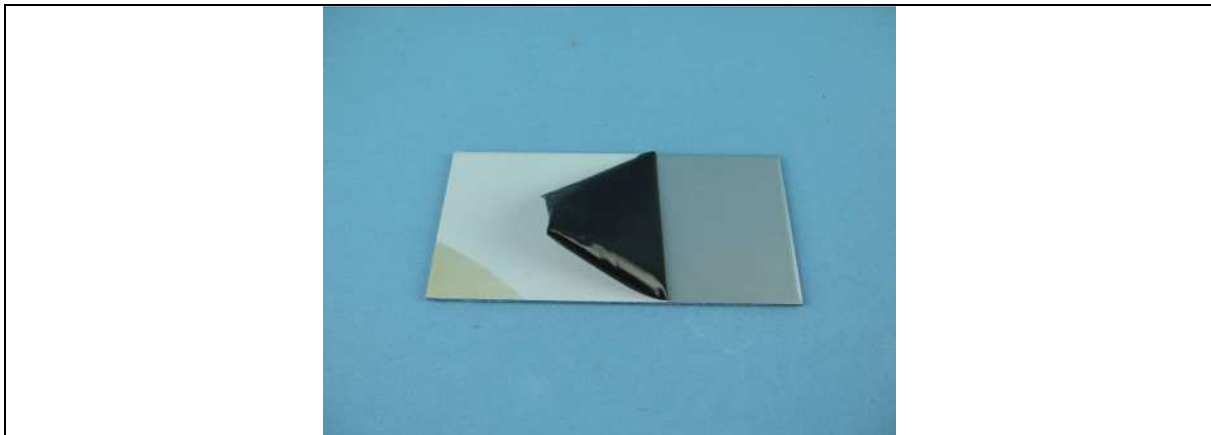
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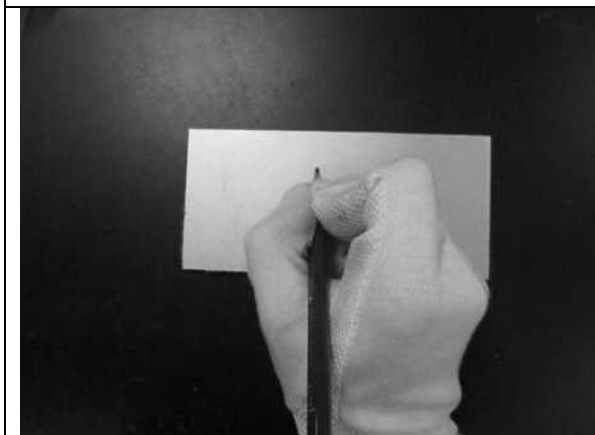
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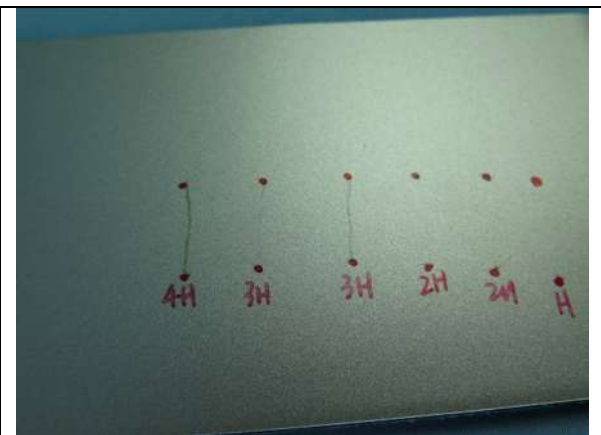
Test Photo:



Original sample



During test



After test



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10. Test item: Pull-off Test for Adhesion

Sample description: See photo

Test method: ASTM D4541-09^{e1} Method E

Test condition:

Tensile stress rate: 0.2MPa/s

Dolly diameter: 20mm

Adhesive: 3M Scotch-Weld™ DP 460

Adhesive curing time: 24h

Test result:

Test item	Tensile stress	Type of fracture (see note 1)
Pull-off Test for Adhesion	2MPa	100%C

Note:

1. According to ASTM D4541-09^{e1} Method E, the type of fracture as follows:

A: cohesive failure of substrate;

A/B: adhesive failure between substrate and 1st coat;

B: cohesive failure of 1st coat;

C: cohesive failure of 2nd coat;

B/C: adhesive failure between 1st coat and 2nd coat;

n: cohesive failure of *n*th coat of a multicoat system;

n/m: adhesive failure between *n*th coat and *m*th coat of a multicoat system;

-/Y: adhesive failure between topcoat and adhesive;

Y: cohesive failure of adhesive;

Y/Z: adhesive failure between adhesive and dolly.

2. The protected film of test specimens was ripped off before test.



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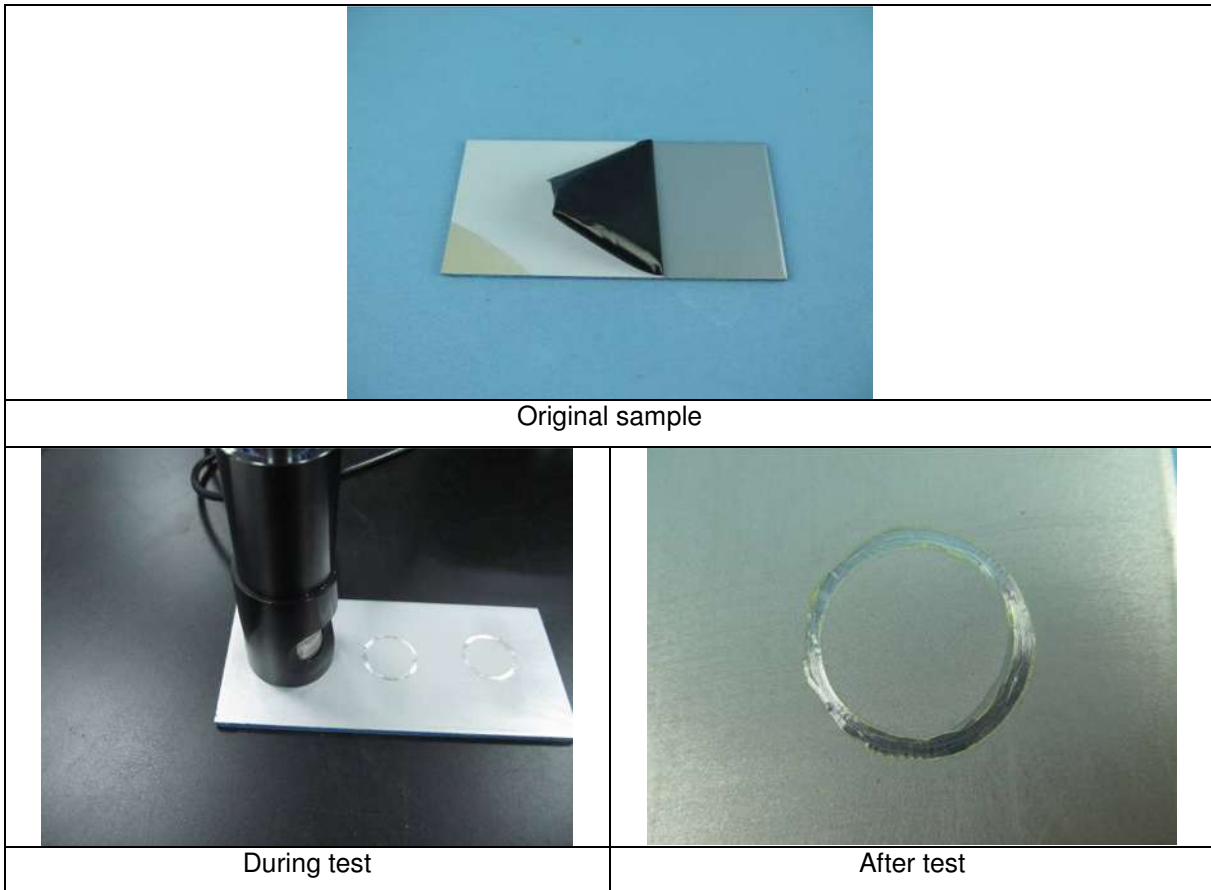
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11. Test Item: Scratch Resistance

Sample Description: See photo

Test Method: ISO 1518-1:2011

Test Condition:

Rubbing stylus: Hemispherical hard-metal tip of radius (0.5±0.01)mm

Stroke: 40 mm

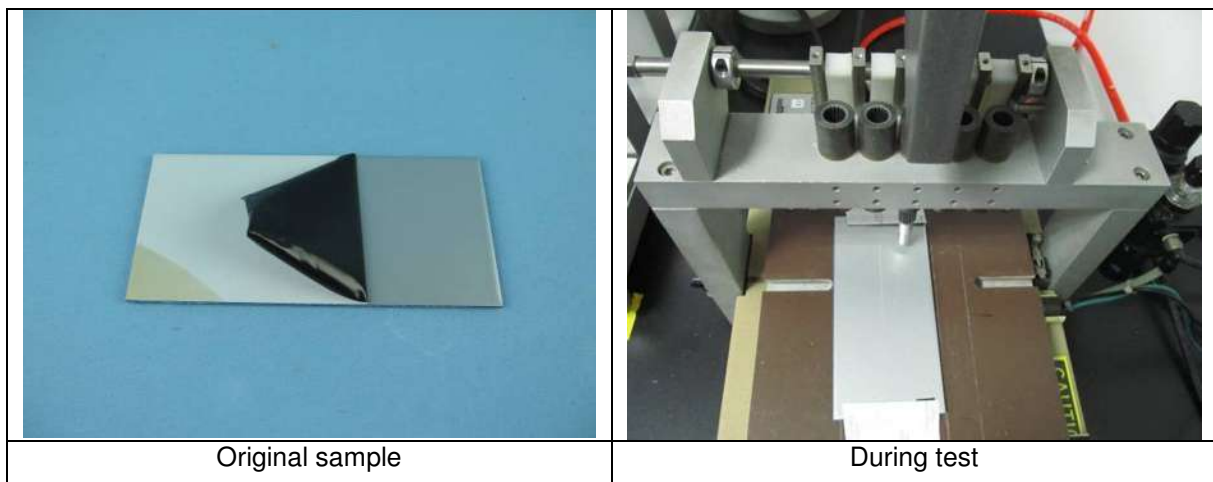
Rubbing Rate: (35±5) mm/s

Test Result:

Test Item	Test Result
Scratch Resistance	Penetration to the undercoat but no penetration to the base metal with 20N

Note: The protected film of test specimens was ripped off before test.

Test Photo:

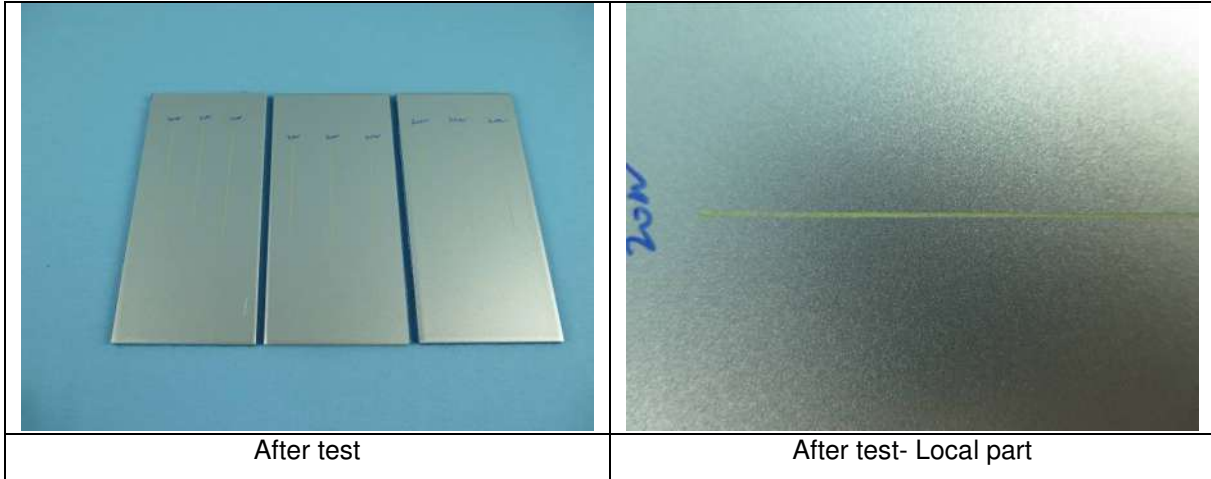


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12. Test Item: Water Resistance (Immersion Method)

Sample Description: See photo

Test Method: ASTM D 870-15

Test Condition:

Temperature: 38°C

Duration of the test: 24h

Test Result:

Test Item	Appearance
Water Resistance (Immersion Method)	No color or gloss change

Note: The protected film of test specimens was ripped off before test.



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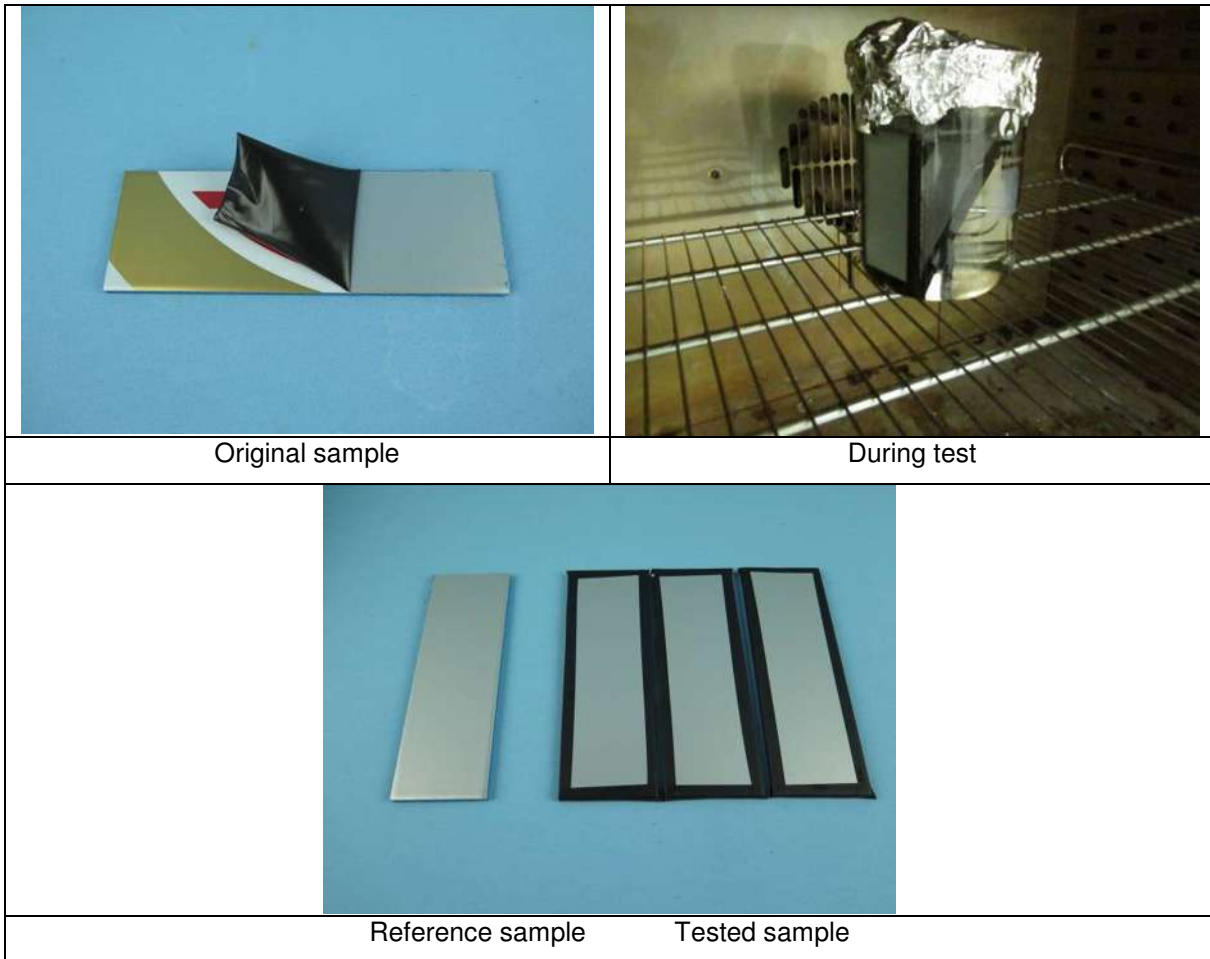
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Test Photo:



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13. Test Item: Boiling Water Adhesion

Sample Description: See photo

Test Method: AAMA 2604-13 Section 8.4.1.1, Section 8.4.1.4, Section 8.4.1.2, Section 8.4.2

Test Condition:

Cut space: 1mm

Immersed in boiling water for 20min

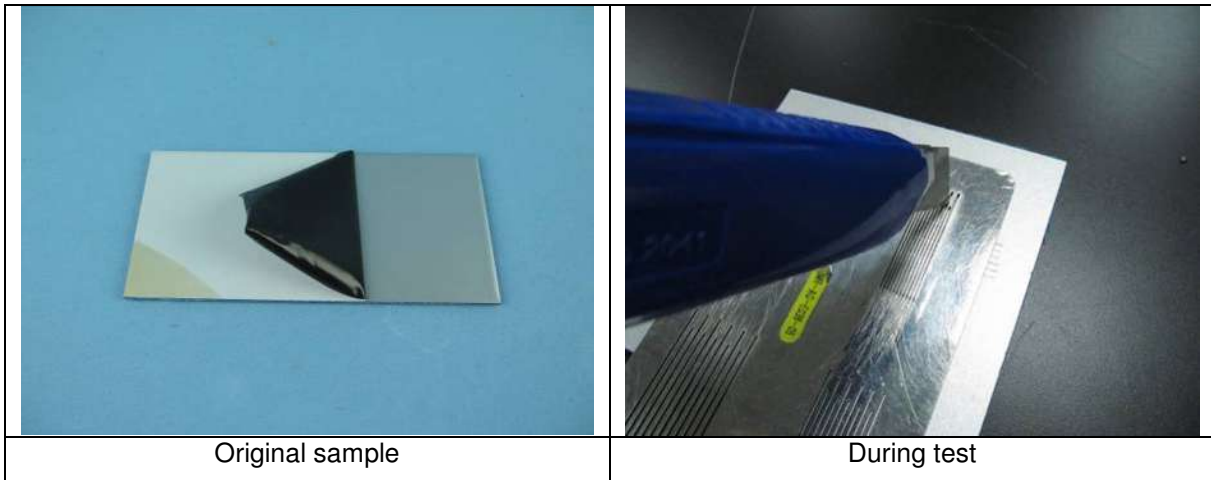
Tape: Elcometer 99

Test Result:

Test Item	Test result
Boiling Water Adhesion	No removal of film, blistering or loss of adhesion

Note: The protected film of test specimens was ripped off before test.

Test Photo:



Original sample

During test



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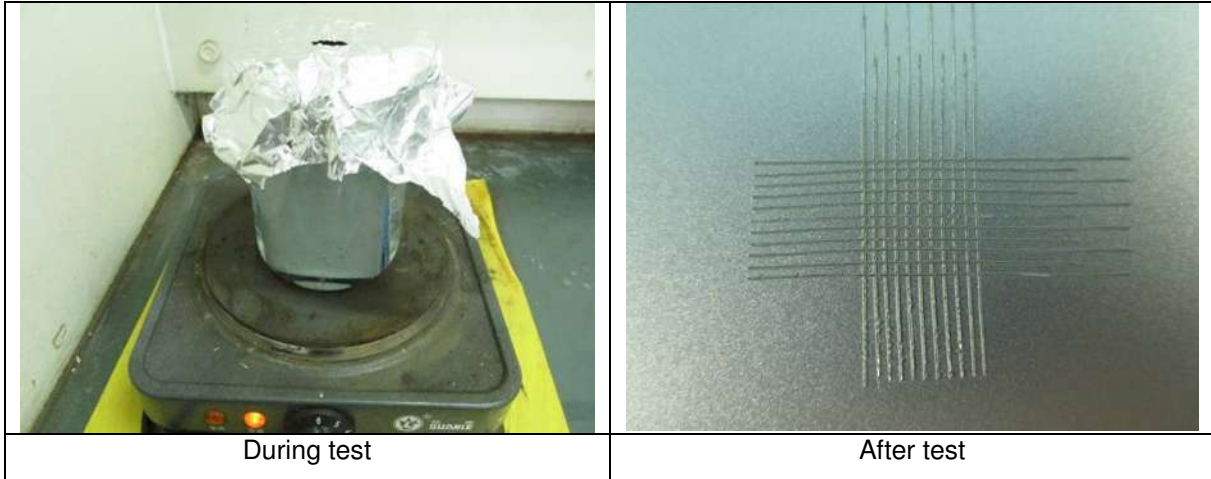
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14. Test Item: Mortar Resistance

Sample Description: See photo

Test Method: AAMA 2604-13 Section 8.7.2

Test Condition:

Temperature: 38°C

Humidity: 100%RH

Exposure period: 24h

Test Result:

Test Item	Test Result
Mortar Resistance	No loss of adhesion or any other visual change

Note:

1. The mortar composition is as follows:

Building lime: 75g

Dry sand: 225g

Water: 100g

2. The protected film of test specimens was ripped off before test.



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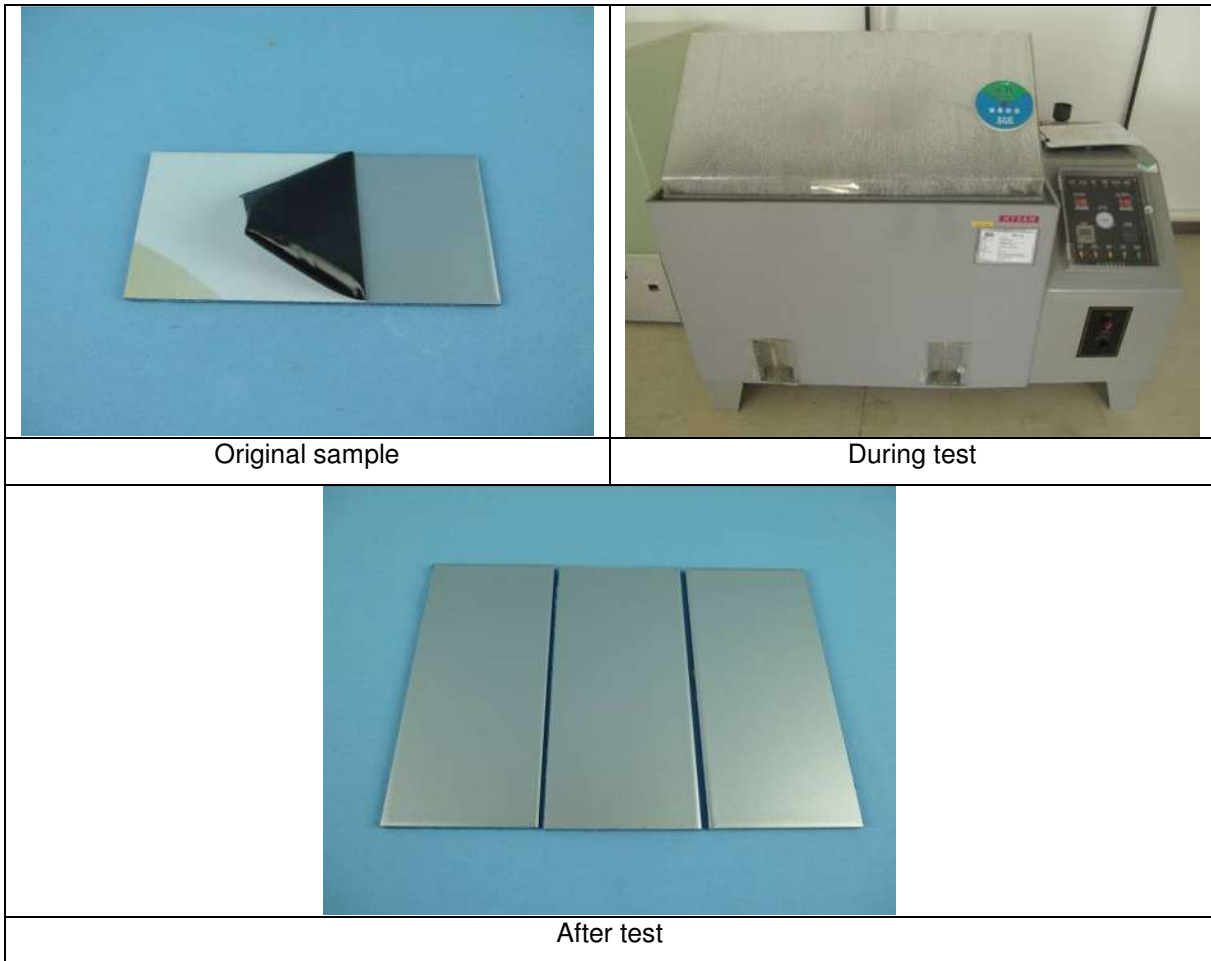
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15. Test Item: Deflection Temperature under Load

Sample Description: See photo

Test Method: With reference to ASTM D648-16 and client's requirement

Test Condition:

Specimen: 127mm × 13.56 mm × 4.32 mm

Heat-transfer media: Silicone oil

Rate of temperature: 120°C/h

Load: 1.82MPa

Span: 64mm

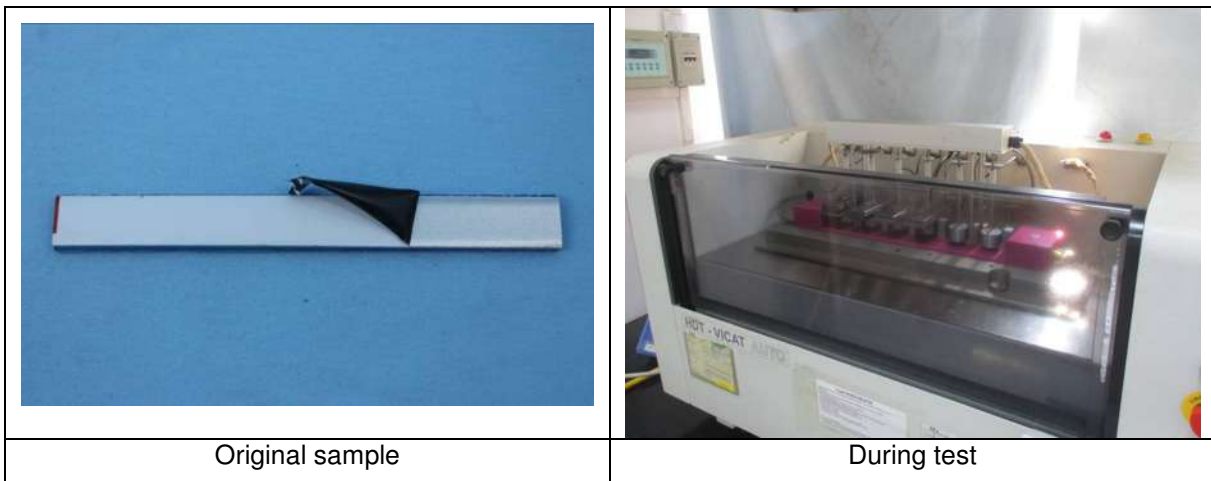
Lab Environmental Condition: (23±2)°C, (50±5)%RH

Test Result:

Test Item	Test Result
Deflection Temperature under Load	111.0 °C

Note: The protected film of test specimens was ripped off before test.

Test Photo:



Original sample

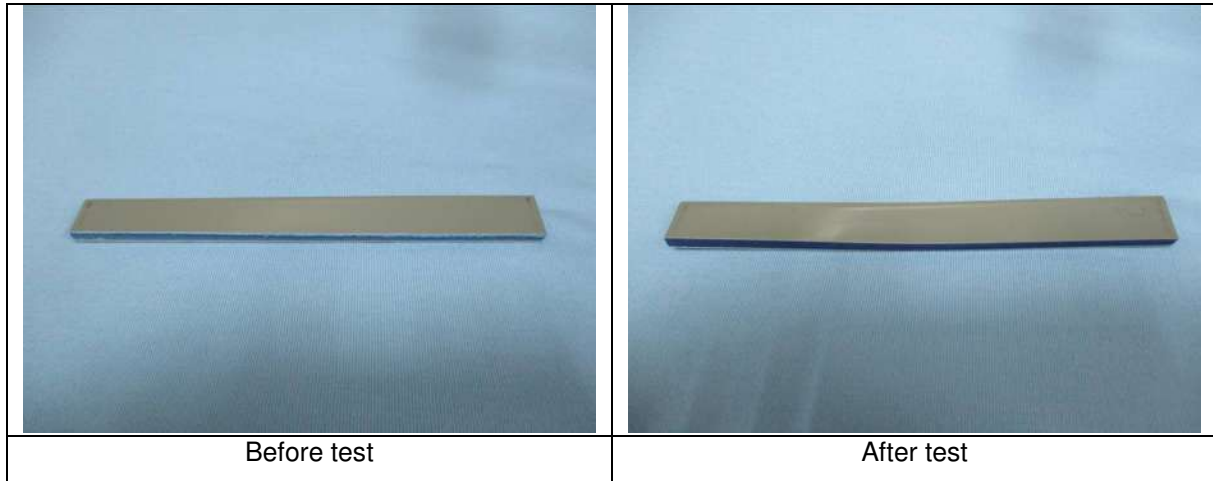
During test

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16. Test Item: Density

Sample Description: See photo

Test Method: ASTM C271/C271M-16

Test Condition:

Precondition: (23±2)°C, (50±5)%RH, 48 h

Specimen: 301 mm × 301 mm × 4.49 mm

Lab Environmental Condition: (23±2)°C, (50±5)%RH

Test Result:

Test Item	Test Result
Density	1280 kg/m ³

Note: The protected film of test specimens was ripped off before test.



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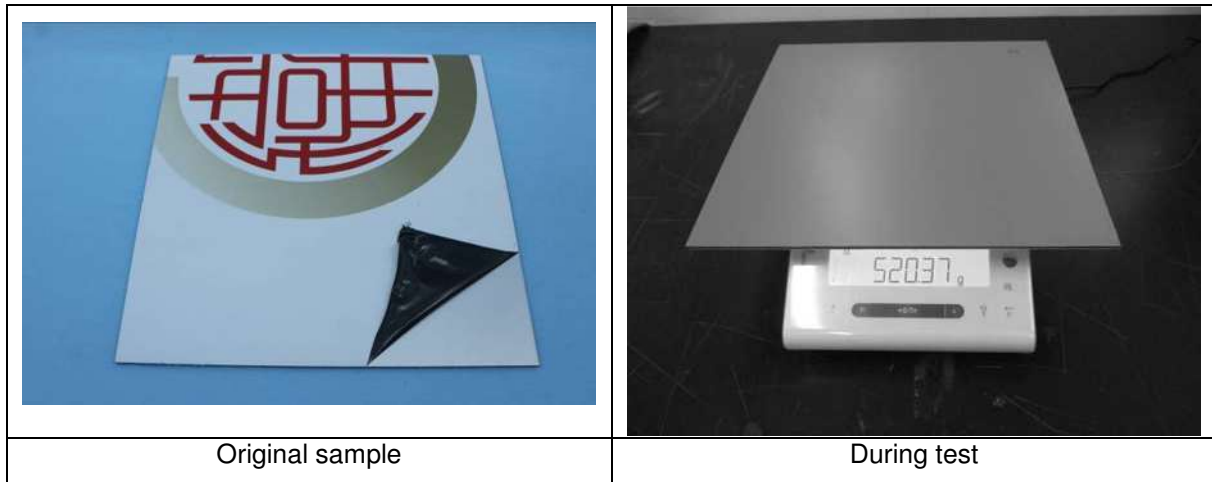
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Test Photo:



17. Test Item: Flexural Test

Sample Description: See photo

Test Method: With reference to ASTM D790-15^{e2} Procedure A and client's requirement

Test Condition:

Specimen: 127 mm×13.44 mm×4.35 mm

Testing speed: 1.3mm/min

Span: 70mm

Lab Environmental Condition: 23±2℃, 50±5%RH

Test Result:

Test Item	Test Result
Flexural Strength	111 MPa
Flexural Modulus	10900 MPa

Note:

1. The surface with protected film was faced to the loading.
2. The protected film of test specimens was ripped off before test.



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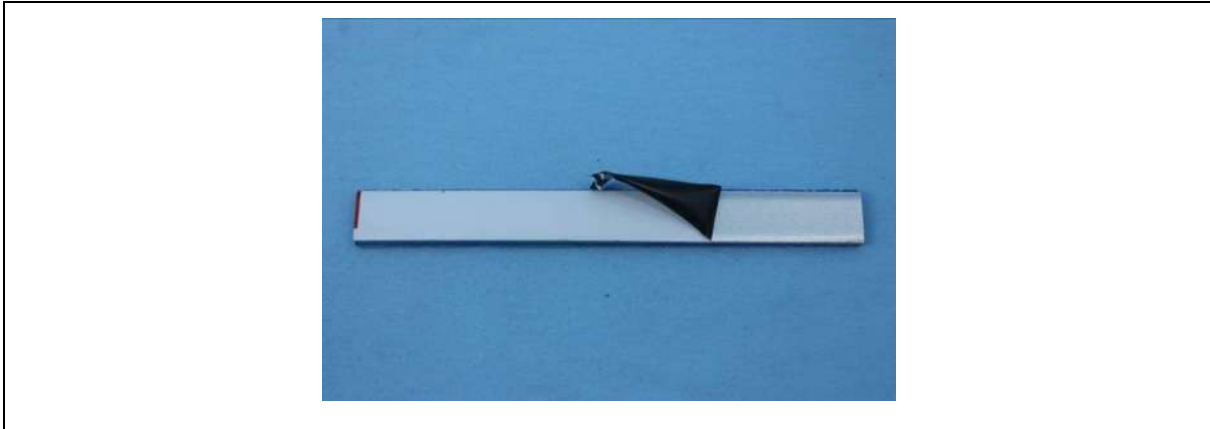
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Test

Photo:



Original sample



During test



After test



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18. Test Item: Mass per Unit Area

Sample Description: See photo

Test Method: With reference to ASTM D5947-11 and client's requirement

Test Condition:

Specimen: 301 mm × 301 mm × 4.49 mm

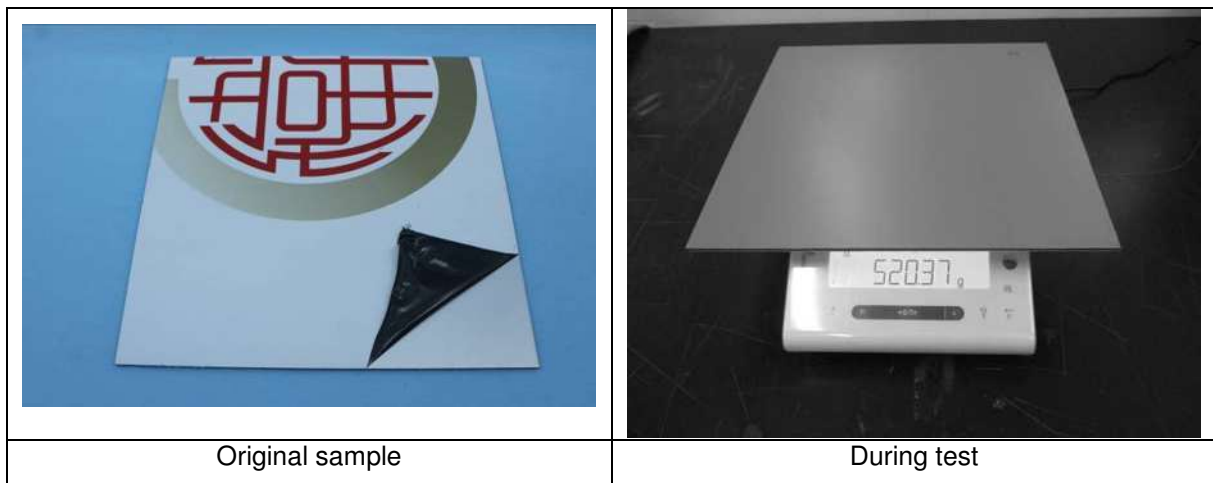
Lab Environmental Condition: 23±2°C, 50±5%RH

Test Result:

Test Item	Test Result
Mass per Unit Area	5735 g/m ²

Note: The protected film of test specimens was ripped off before test.

Test Photo:



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19. Test Item: Peel Strength

Sample Description: See photo

Test Method: ASTM D903-98(2010)

Test Condition:

Specimen width: 25 mm

Separation speed: 152.4 mm/min

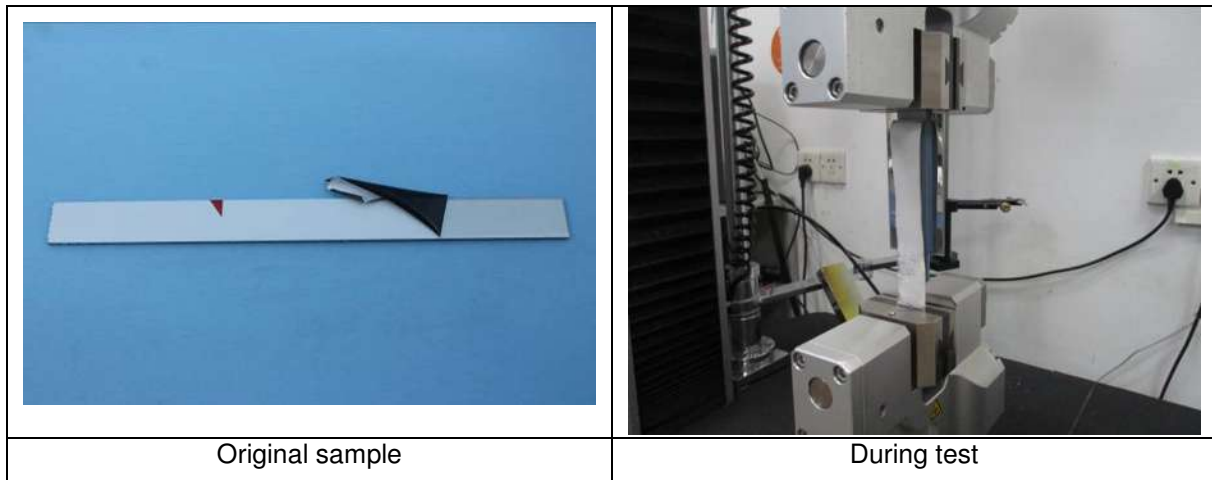
Lab Environmental Condition: 23 ± 2 °C , 50 ± 5 % RH

Test Result:

Test Item	Test Result
Peel Strength	1.06 kgf/mm

Note: The protected film of test specimens was ripped off before test.

Test Photo:

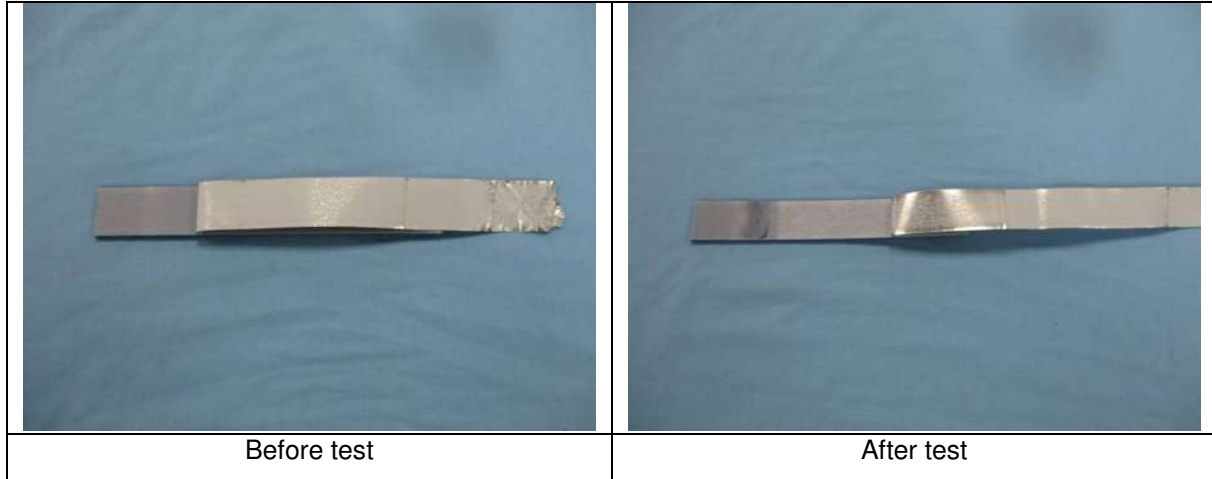


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20. Test Item: Flexural Shear Strength

Sample Description: See photo

Test Method: ASTM C393/C393M-16

Test Condition:

Specimen: 201 mm × 75.6 mm × 4.32 mm

Core thickness: 3.33 mm

Testing speed: 6 mm/min

Span: 150 mm

Lab Environmental Condition: 23±2°C, 50±5%RH

Test Result:

Test Item	Test Result
Flexural Shear Strength	1.75 MPa (See note 1)

Note:

1. Failure mode: FAB
2. The surface with protected film was faced to the loading.
3. The protected film of test specimens was ripped off before test.



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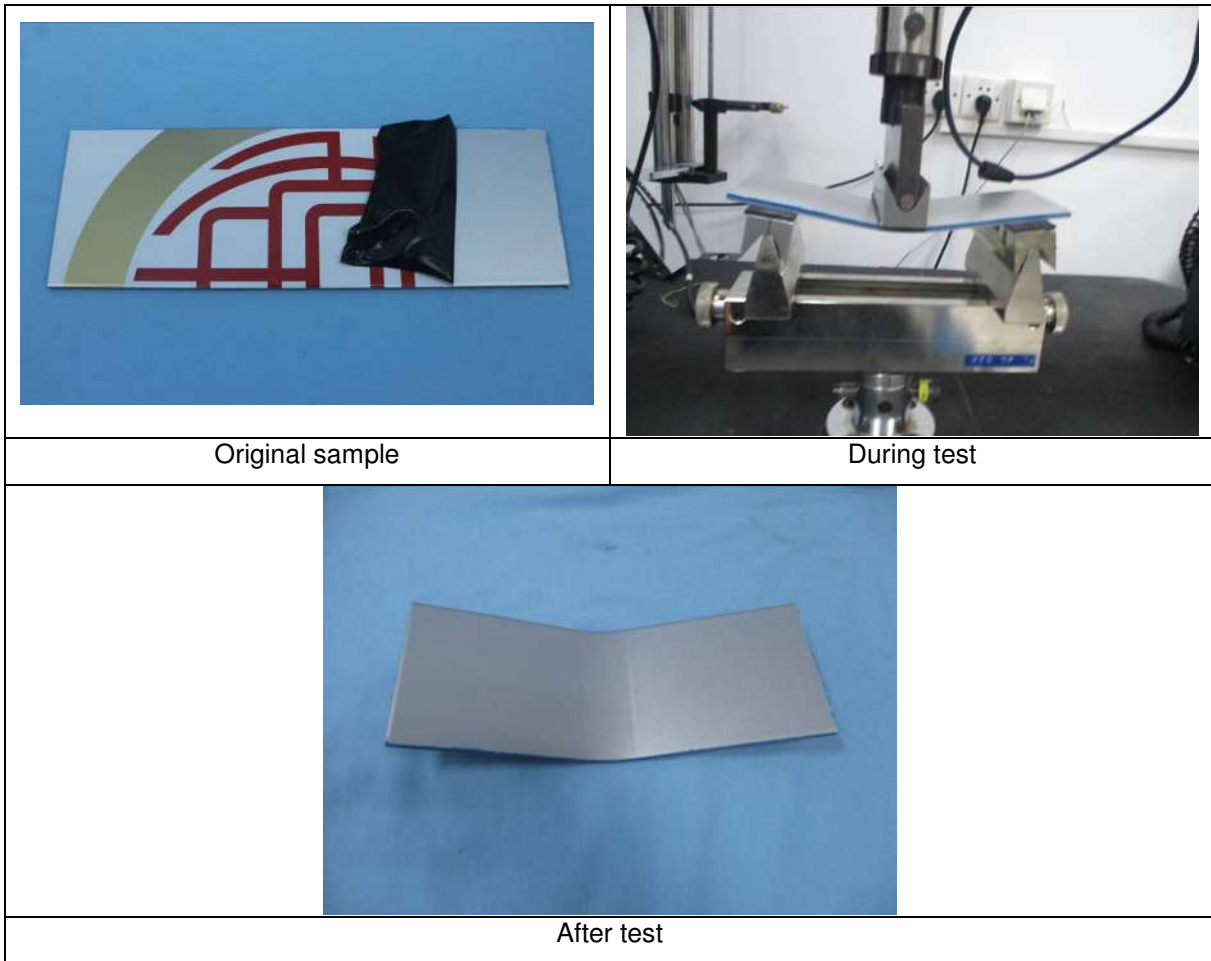
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21. Test Item: Shear Strength

Sample Description: See photo

Test Method: ASTM D732-10

Test Condition:

Specimen thickness: 4.20 mm

Punch diameter: 25mm

Testing speed: 1.3mm/min

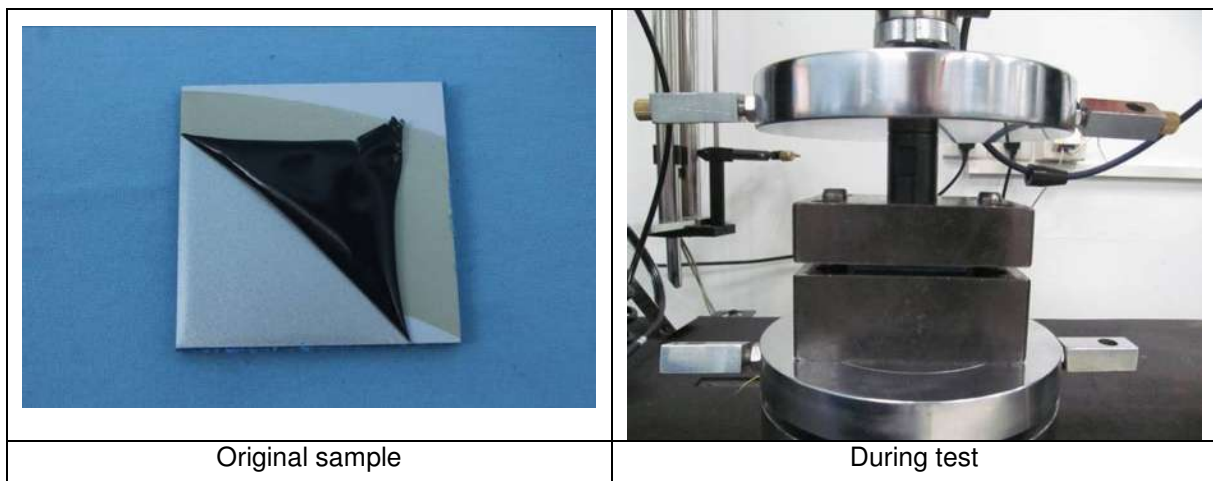
Lab Environmental Condition: 23±2°C, 50±5%RH

Test Result:

Test Item	Test Result
Shear Strength	31.6 MPa

Note: The protected film of test specimens was ripped off before test.

Test Photo:

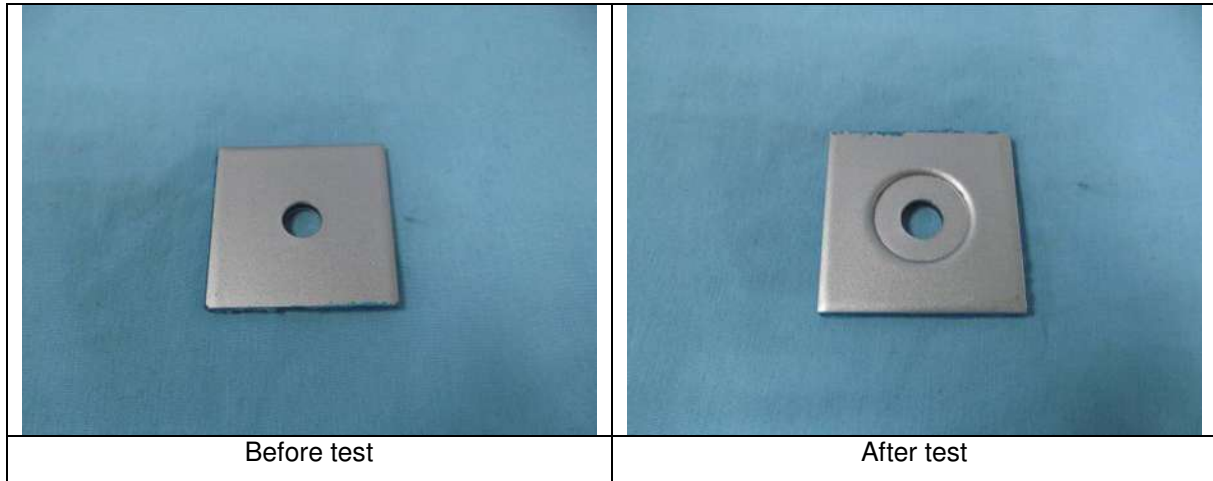


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22. Test Item: Flatwise Tensile Strength

Sample Description: See photo

Test Method: ASTM C297/C297M-16

Test Condition:

Specimen: 51 mm × 51 mm

Testing speed: 0.5 mm/min

Lab Environment Condition: (23 ± 2) °C, (50 ± 5) % RH

Test Result:

Test Item	Test Result
Flatwise Tensile Strength	6.65 MPa (See note 1)

Note:

1. Type of failure: Cohesive failure of core- facing adhesive.
2. The protected film of test specimens was ripped off before test.



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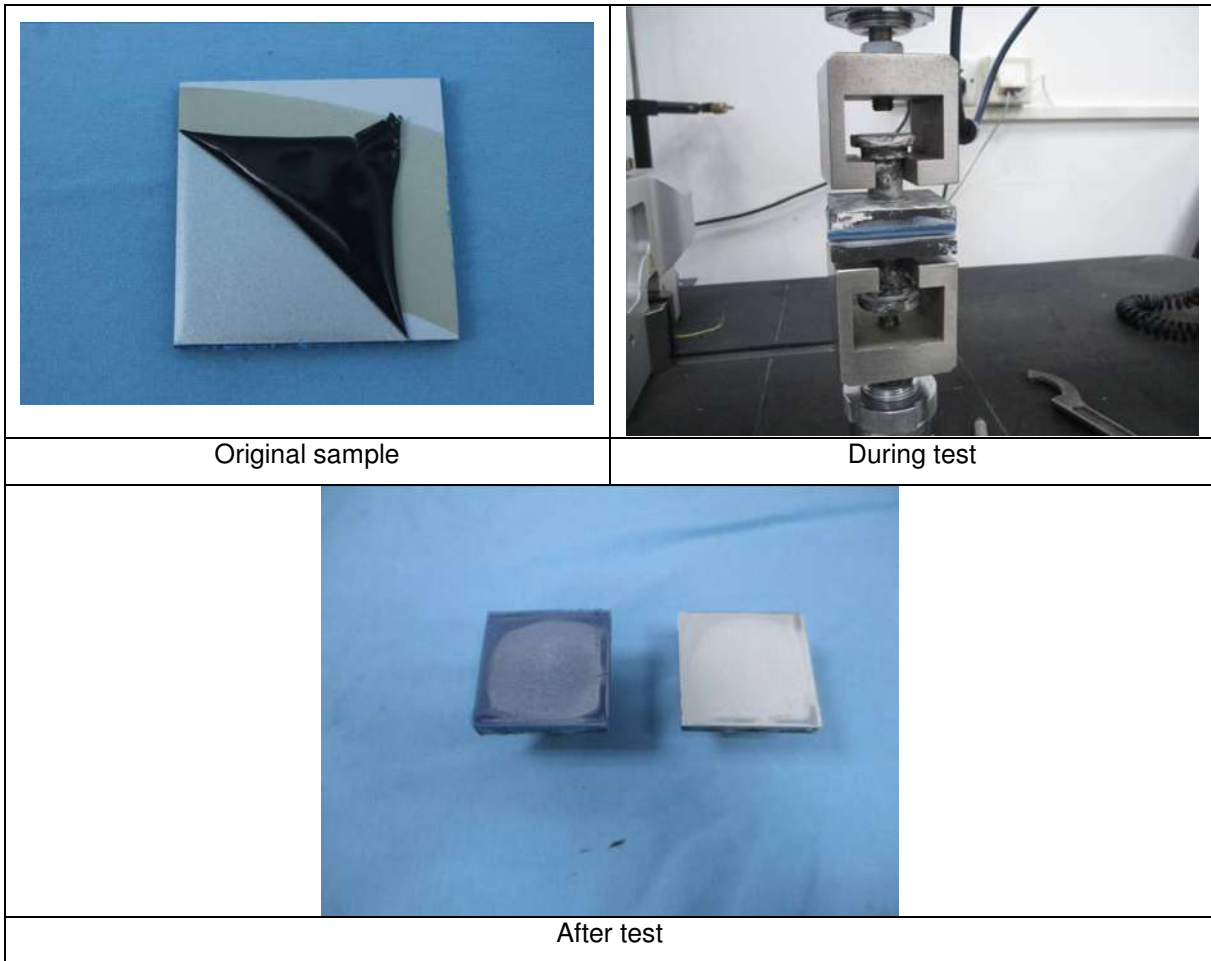
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23. Test Item: Tensile Test

Sample Description: See photo

Test Method: ASTM D638-14

Test Condition:

Specimen: Type I

Specimen thickness: 4.27 mm

Testing speed: 5 mm/min

Distance between grips: 115 mm

Lab Environmental Condition: 23 ± 2 °C, 50 ± 5 % RH

Test Result:

Test Item	Test Result
Tensile Strength	48.6 MPa
Tensile Stress at Yield	48.6 MPa

Note:

1. Test specimens were cut from the sample.
2. The protected film of test specimens was ripped off before test.

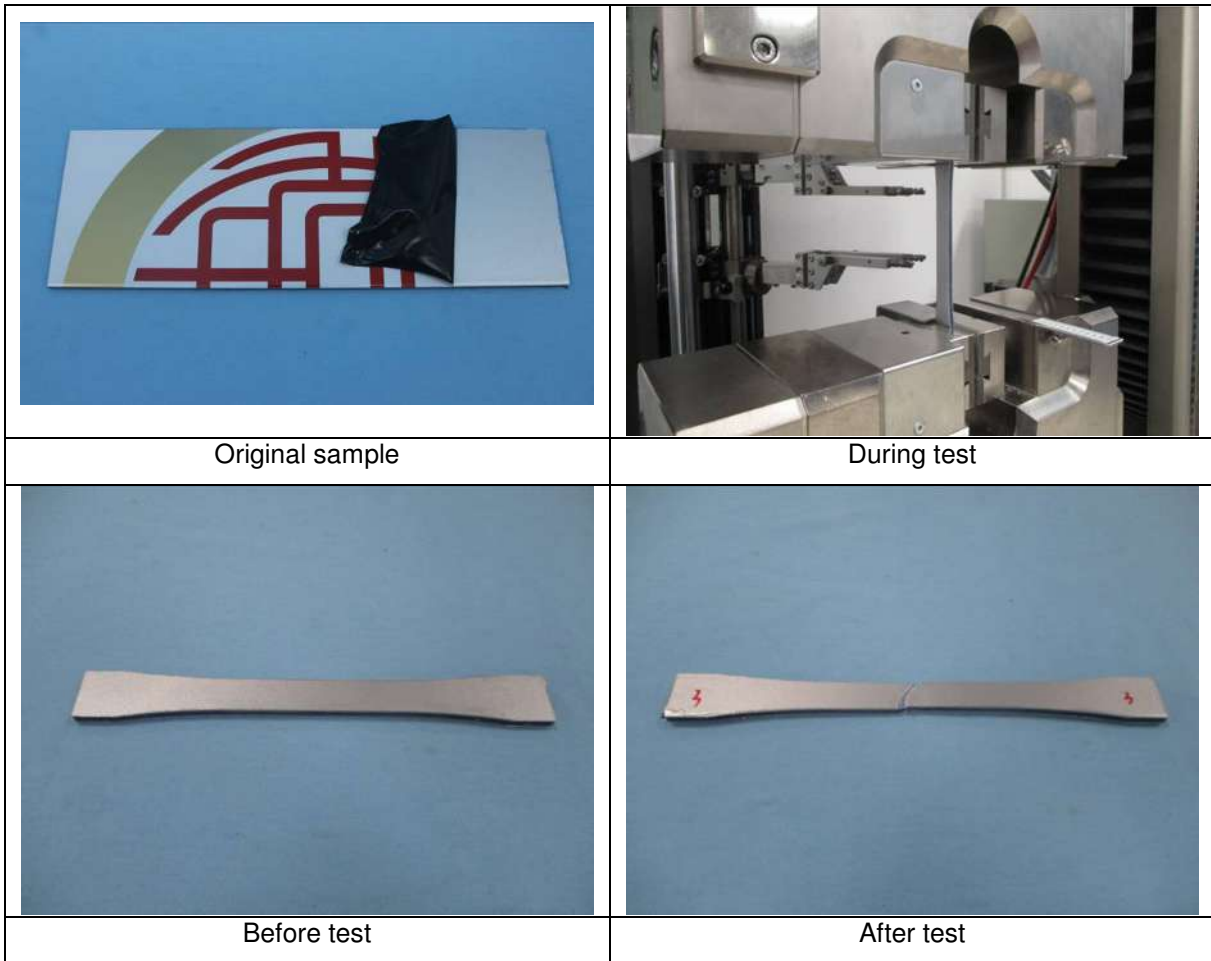


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24. Test Item: Plane Shear Test

Sample Description: See photo

Test Method: ASTM C273/C273M-16

Test Condition:

Specimen: 60 mm × 50 mm × 4.20 mm

Specimen core thickness: 3.39 mm

Testing speed: 0.5 mm/min

Test mode: Tension test

Lab Environmental Condition: 23 ± 2 °C, 50 ± 5 % RH

Test Result:

Test Item	Test Result
Plane Shear Strength	6.65 MPa (See note 1)
Plane Shear Modulus	33.3 MPa

Note:

1. Failure mode: SGM.
2. Test specimens were cut from the sample.
3. The protected film of test specimens was ripped off before test.



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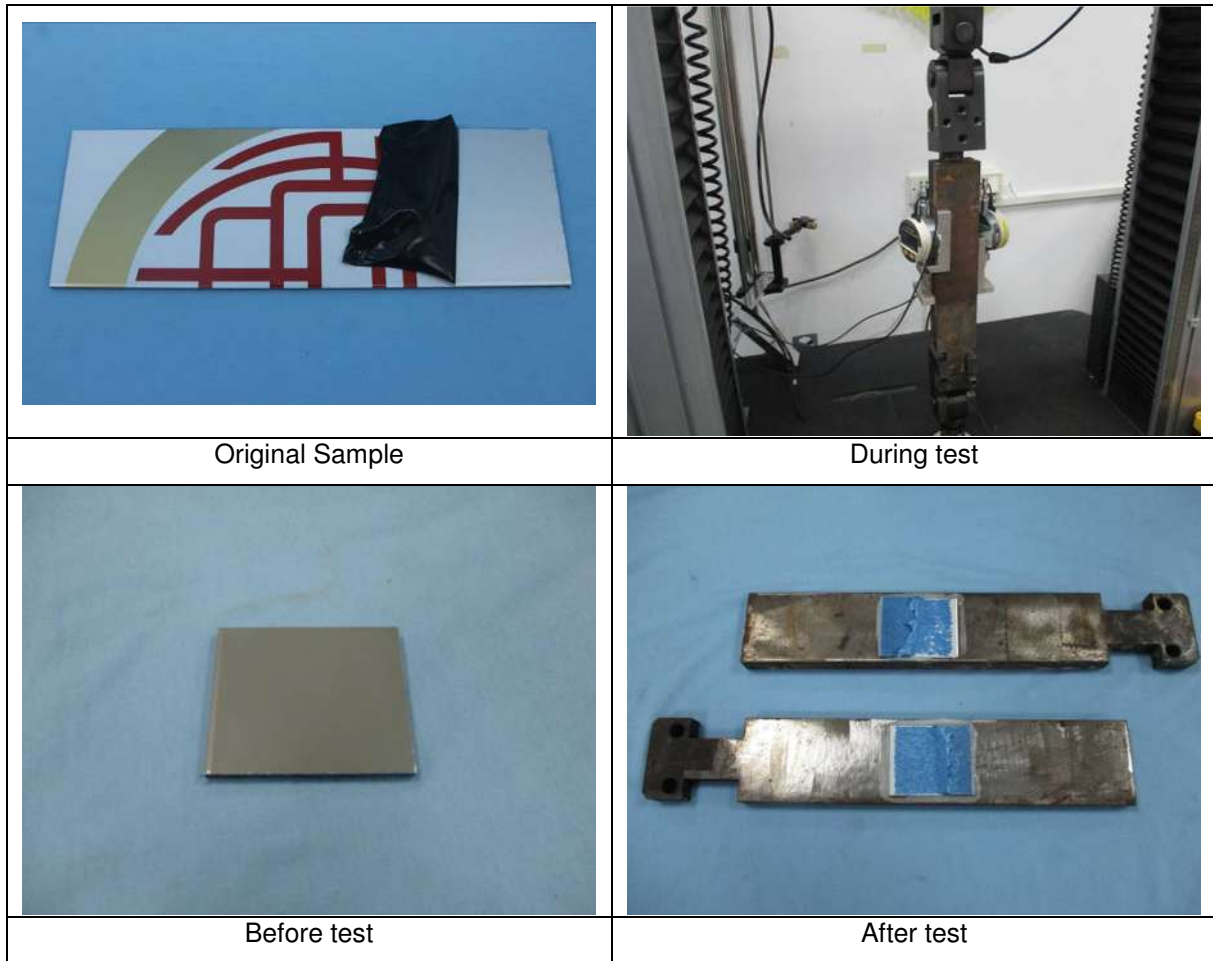
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Test Photo:



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